



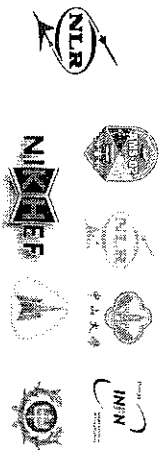
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Issue draft 06
Date December 2008

7 Condenser gluing procedure sheets for FM condensers

Condenser gluing procedure sheet			company: A10C	date: 8 JANUARY 2009		
Fill in by hand.			engineer: E. J. J.	location: A10C		
Step	Action	Monitoring	Value	Result	Comment	
1.	Record model (FM) for which the gluing preparations are prepared	Model	PW/SR/SW/PR	SR FR2		✓
2.	Record degrease equipment used					
3.	Degrease aluminium plates: bottom plate/top plate/strain relief bottom/strain relief top plate				REMOVED ON: DECEMBER 10TH	
4.	Put all the plates in a container for the degreasing			OK		
5.	Take out and store in a Kraft paper			OK		
6.	Record sandblast equipment used	Manufacturer, type/serial number	SANKU-90 SANDBLAST SN: 99 A68-6	MODEL: TH-REF POWER 30000W		
7.	Record grit material used 180-220 dry grit	Manufacturer/grit size/material	180/220-A1203	A80 A203		
8.	Sandblasting aluminium plates: bottom plate/top plate/strain relief bottom/strain relief top plate				REMOVED ON DECEMBER 10TH	



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Condenser gluing procedure sheet		company:		date:	
Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	Result	Comment
9.	Sandblast with 45 psi : <ul style="list-style-type: none">(grooved side) bottom plate(gluing side) top plate(grooved side) bottom strain relief plate(gluing side) top strain relief plate	Pressure	45 psi	45 psi	
10.	Remove all sanding residue by blowing dry oil-free air			OK	
11.	Store in a clean and dry place for further processing			OK	
12.	SURFACE TREATMENT AND GLUING (should be done within 8 hours!!)				
13.	Verify glue/adhesive expiry date	Record expiry date 8 AUGUST '08	> date of application 8 JANUARY 2009	8 JANUARY 2009	EXTENSION OF GLUE LIFE BY ONE TEST-DTO 24 JANUARY 2009
14.	Verify all gluing can be performed within 8 hours after following surface treatments			OK	
15.	SURFACE TREATMENT INCONEL 718 TUBES	Record start time			PROCESS DECONTAMINATED ON 8TH JANUARY BY ALC
16.	Verify the manifold tubes are closed with Swagelok connectors				READY AT 7:30 a.m. FOLLOWING SAME PROCESS OF EFF.
17.	Vapour degreasing the TUBES with Trichloroethylene at 185-195°F (85-90.5 °C)				SURFACE TREATMENT OF TUBES



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Condenser gluing procedure sheet				company:	date:	
	Fill in by hand.			engineer:	location:	
Step	Action	Monitoring	Value	Result	Comment	✓
18.	Prepare a bath with solution as described in step 35. The bath should be deep enough to immerse the tubes in the bottom plate AND the strain relief tubes			✓		
19.	Immerse the tubes in the bath for 5 min at 140 to 150 F (60 to 65 C) in sulfuric acid dichromate (the same that will be used for preparing aluminum): 1. H2SO4 : 276 ~ 313 g/l 2. Na2Cr2O7 : 59 ~ 90 g/l 3. Al : 1.5 g/l min 4. Cu : 150 mg/l min 5. Cr+3 : 1.9%/wmax 6. Cl : 300 ppm max 7. Etching rate : 0.24 ~ 0.50 mils/surface/hr	Record temperature	145 °F (62.5°C) Record weight hydrochloric acid, weight orthophosphoric acid, and weight hydrofluoric acid.	✓		
20.	Put the tubes in a second bath with DI water and rinse thoroughly with water not over 65 °C	Record temperature and time	50°C	✓		
21.	Spray rinse with DI water at RT	Record temperature and time		✓		
22.	Dry in oven at not over 93 °C					



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Fill in by hand.		engineer:	location:		
Step	Action	Monitoring	Value	Result	Comment
23.	Put tubes in a Kraft paper, in a clean dry place. Handle all parts as little as possible and only with clean, lint free cotton or nylon fabric gloves			/	FINISH TIME 7:30 a.m.
24.	SURFACE TREATMENT BOTTOM PLATE ALUMINIUM AND SUPPORT TOOL (pressure tubes, positioning pins, pressure plate, bonding plate, bonding tool pocket)				RELEASED ON 8 JANUARY, MET READY AT 7.30. a.m.
25.	Vapour degreasing the plates with Trichloroethylene at 185-195°F (85-90.5 °C)				SURFACE TREATMENT TIME IS 2 HOURS
26.	Perform Hot Alkaline with Turco-4215S at 135-145°F (57-63 °C)				
27.	Put the plate in a bath with DI water and hot rinse thoroughly with water at 110-130°F (43-54) °C	Record temperature and time		/	
28.	Spray rinse with DI water at RT	Record temperature and time		/	
29.	Immerse plates for 12-15 minutes at 151-160 °F (66-71 °C) in the following acid solution: 1. H2SO4 : 276 ~ 313 g/l 2. Na2Cr2O7 : 59 ~ 90 g/l 3. Al : 1.5 g/l min 4. Cu : 150 mg/l min 5. Cr+3 : 1.9%/wmax	Record weight acid solution, weight sulfuric acid and sodium dichromate/ Record temperature/record time	155.3 °F (68.5 °C) / 13.5 min	/	



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	Fill in by hand.			engineer:	location:	
Step	Action	Monitoring	Value	Result	Comment	✓
	6. Cl : 300 ppm max 7. Etching rate : 0.24 ~ 0.50 mils/surface/hr					
30.	Put the plates in a second bath with DI water and rinse thoroughly with water not over 149 °F(65 °C)	Record temperature and time	122°F (50°C)	✓		
31.	Spray rinse with DI water at RT	Record temperature and time		✓		
32.	Dry in oven			✓		
33.	Put the plates in a Kraft paper, in a clean dry place. Handle all parts as little as possible and only with clean, lint free cotton or nylon fabric gloves			✓	FINISH TIME: 7:30 a.m.	
34.	APPLYING THE ADHESIVE					
35.	Prepare working plates and support tools, pins, etc. in the glue pot. Measure tubes and support tools, pins, etc. in the glue pot. Measure tubes and support tools, pins, etc. in the glue pot. Measure tubes and support tools, pins, etc. in the glue pot.					
36.	Put the aluminium bottom plates and Inconel tubes on a clean working table				OK	
37.	Put tubes in the Aluminium plate and apply aluminium tape on the surface of the tubes that comes out from the condenser (only for few cm). Then take out the tubes.				TO PREVENT GLUE ON THE INLET AND OUTLET TUBES	



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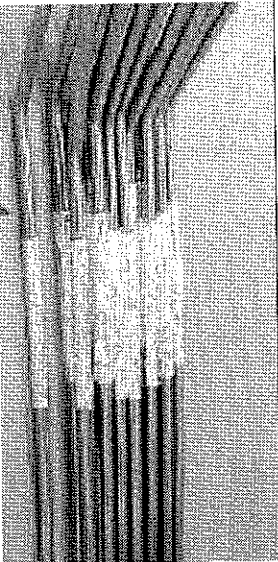
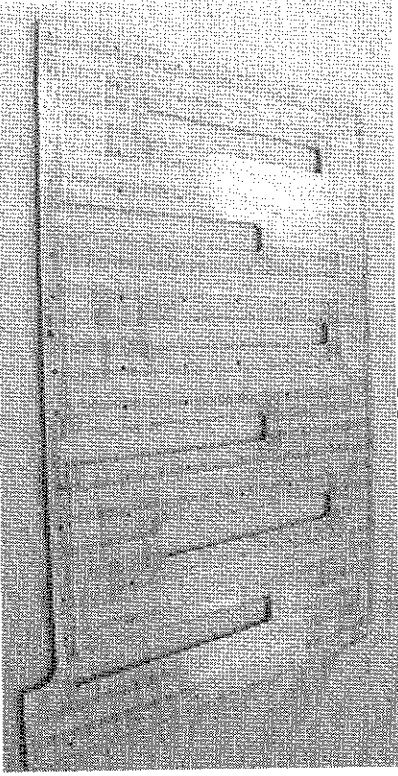
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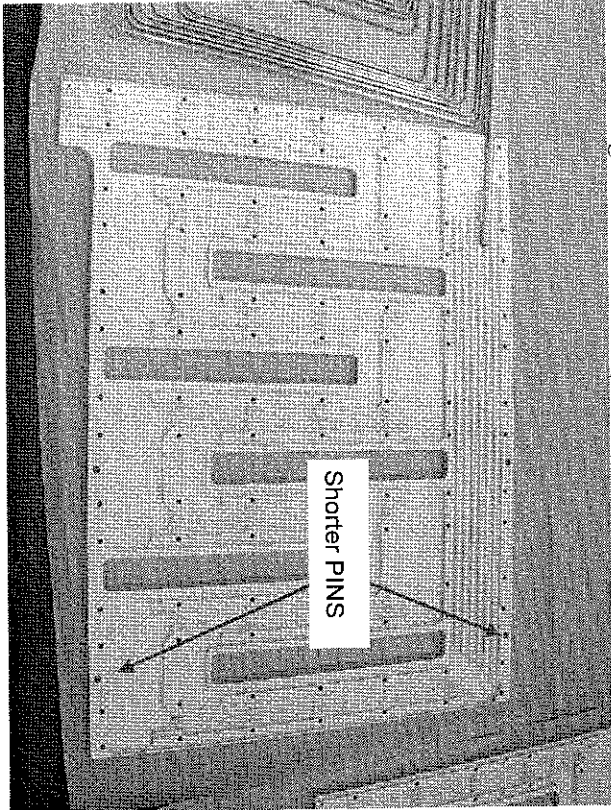
Condenser gluing procedure sheet				company:	date:	
Fill in by hand.				engineer:	location:	
Step	Action	Monitoring	Value	Result	Comment	✓
				TAPE AL 3M 850		
38.	Put adhesive tape 3M 5490 on the border line, on bottom side and in the central reducing mass holes of bottom aluminium plates. The tape will be taken out to remove the exceeding glue.	Record type adhesive tape		3M 850	• TO CHECK IF IT IS BEING TAPE • ALSO SHUT - COBIN TAPE USED BUT NOT ON CRITICAL AREA 2555-2-2011	
						



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Fill in by hand.		engineer:	location:	
Step	Action	Monitoring	Value	Result
39.	Put release agent on aluminium positioning pins and position it	Record release agent used		
				
40.	Glue tubes to bottom plate			
41.	Read and follow the instructions of the manufacturer for the adhesive MASTERBOND EP21TDC-2LO, especially wrt mix ratio and working life (90min). To be used only the amount of glue foreseen for 1 QM/FM	Record Mixing ratio applied	1:3	mixing time 13.24 → no use mixing time: 14:00



Condenser gluing procedure sheet		company:	date:
Fill in by hand.		engineer:	location:
Step	Action	Monitoring	Value
41.	bottom condenser plate.		
42.	<p>To avoid bubble air in the glue, perform the following for each time a new amount of glue is mixed:</p> <ul style="list-style-type: none"> • Mix the A and B compound • Pull a vacuum, repeatedly, i.e. pull-relax, pull-relax, pull-relax... (at least 15 minutes) 		OK
43.	<p>Apply the glue on the bottom of the pockets and in the edges (of bottom plate) carefully by a gun with a tip dispenser of approximately 0.9mm.</p>	Record time of application of glue	14:20



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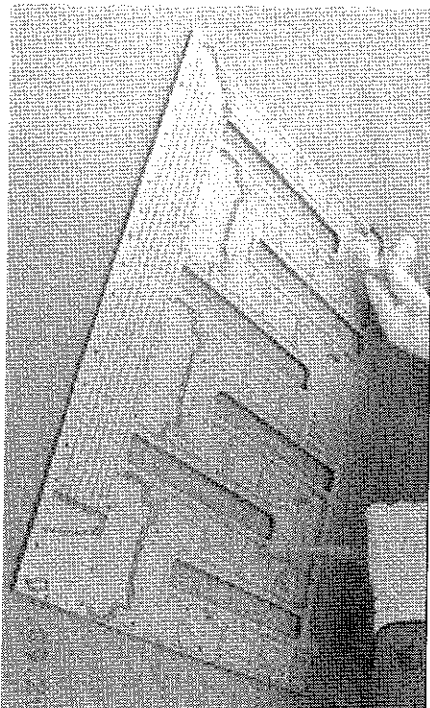
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Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	Result	Comment
					OK
	Cut with a slope the tip dispenser to enlarge the gluing area and fill the bottom of the pockets completely.				
44.	Put also a small layer of glue in the grooves, always with the cut tip dispenser. However put no glue on the grooves for bonding top plate "teeth": these parts are for pushing the tubes in right position and should have no glue.			OK	



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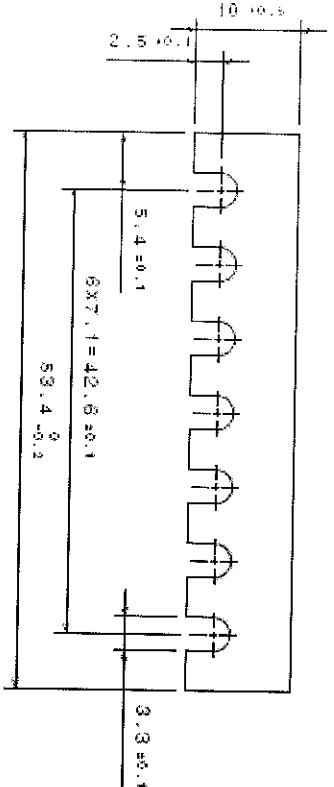
Condenser gluing procedure sheet		company:		date:	
Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	Result	Comment
45.	Put the tubes and press them in place using the tubes frame (they will be used very temporarily). Use rulers/knives and press them by hand. (see appendix A for drawings and sketches)			OK	



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Step	Action	Monitoring	Value	Result	Comment
46.	<p>Apply release agent on the bonding pocket tool to let it be removed after the gluing and position it.</p>  				<p>APPLY THE COMB AT THE END OF PROCESS! AFTER REMOVE PLANS</p>
47.	Gently remove the rulers or frame which press the tubes into the plate				



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Fill in by hand.				engineer:	location:	
Step	Action	Monitoring	Value	Result	Comment	✓
48.	Completely fill the bottom plate with cut tip dispenser and a spatula to flatten the surface. Try to keep the layer thickness ≤ 0.5 mm			OK		
						
49.	Remove, where possible, the exceeding glue			OK		
50.	Put a release film over the surface of the bottom plate and position the bonding plate over the bottom plate, using the position pins			OK		



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Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	Result	Comment
51.	Insert the bottom strain relief (covered with the release film) over the bonding top plate, using 2 positioning screws, to support the tubes during the vacuum bag and to prevent excessive bending of the tubes.				no release film
					



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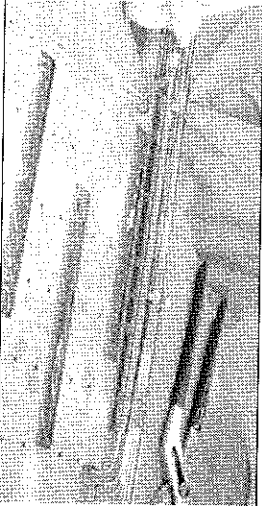
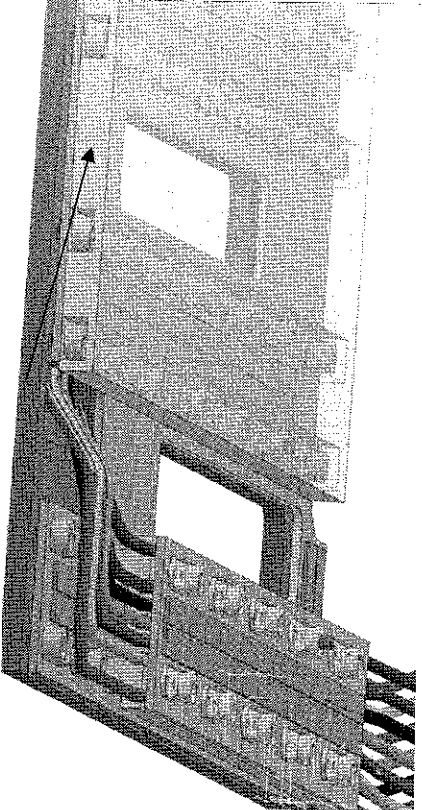
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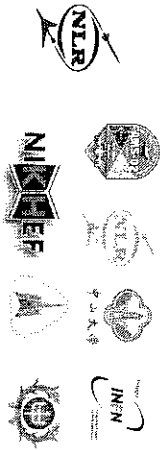
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Step	Action	Monitoring	Value	Result	Comment	
					ALSO A FIXTURE TO SUPPORT TUBE ON THE BACKSIDE OF STRAIN RELIEF	✓
52.	Position the pressure plate over the top bonding plate (no nutplates are present in this step). NOTE: THE PRESSURE PLATE HAS BEEN MODIFIED TO ALLOW PINS GO THROUGH.				8 PRESSURE PLATES	
						



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Fill in by hand.				engineer:	location:
Step	Action	Monitoring	Value	Result	Comment
53.	Put all the assembly on a vacuum bag and cure for 1 day				PUT ONLY 2 PINS ON STRAIN RELIEF SIDE
54.	SURFACE TREATMENT and NUTPLATE INSTALLATION ON TOP PLATE				FINISH TIME 15:10.
55.	Perform the surface treatment of ONLY TOP plate following the procedure of the Bottom plate (from step to 28 to 36).				9 JANUARY 2009 FINISH TIME: 7:00 a.m.
56.	Paint the contact surface between nutplate and top plate holes with Super Koropon Primer Base 51.5-700 (Don't add MEK, just use small amount of Super Koropon in a little cup and then refill when finished). Install the 88 nutplates using the installation tool DCBT8600-06				STARTING TO INSTALL NUTPLATE 7:40 a.m.



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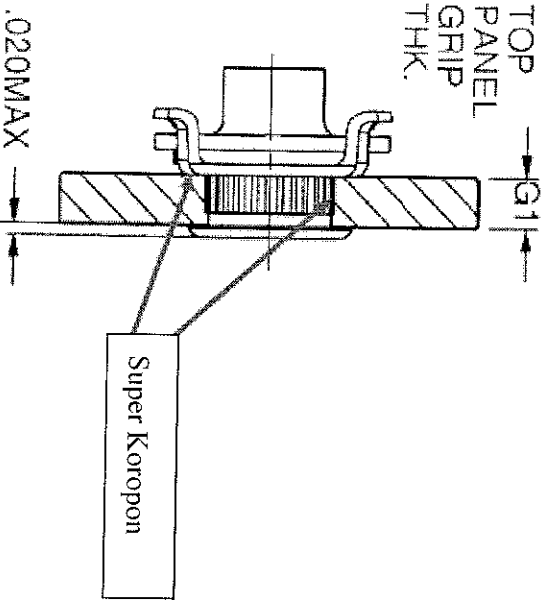
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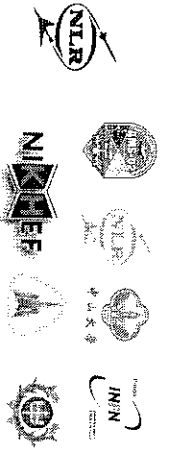
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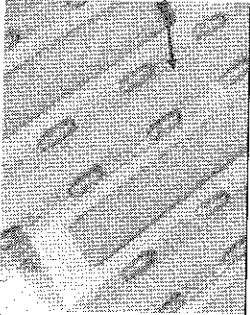
Condenser gluing procedure sheet				company:	date:
Fill in by hand.				engineer:	location:
Step	Action	Monitoring	Value	Result	Comment
57.	<p>Apply 3M 5490 tape on top plate:</p> <ul style="list-style-type: none">• To the border line• in the central reducing mass holes• On the TS and heaters location• Over the nutplates			OK	<p>FINISH TIME : 8:35 a.m. NO CHANGE ON INSTALLATION TOOL.</p>
					<p>USED THE 311850 AT THE ENTRANCE OF TUBE</p>



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Step	Action	Monitoring	Value	Result	Comment	
58.	<p>The tape will be taken out to remove the exceeding glue.</p> <p>Apply small square size pieces of the 3M 850 on holes of the top plate (inner side, the one that will be glued) as in the following picture (only for square size reference).</p>  <p>NO TAPE ON:</p> <ul style="list-style-type: none"> JIG PIN POSITION STRAIN RELIEF PIN POSITION 			OK	HOLES ON THE 2 PINS	✓



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Fill in by hand.			engineer:	location:	
Step	Action	Monitoring	Value	Result	Comment
				OK	
59.	open the vacuum bag and remove: <ul style="list-style-type: none">the short pins on the strain relief sidethe bottom strain relief,the bonding top platethe release film				OK, DRILLED ONE HOLE TO PUT THE 3rd POSITIONING PIN ON STRAIN RELIEF SIDE
60.	Check if voids are in the gluing surface, using a needle and a knife. If yes, enlarge the little air bubble areas using a drill and re-fill with glue.			OK	(LESS VOIDS THAN EX)



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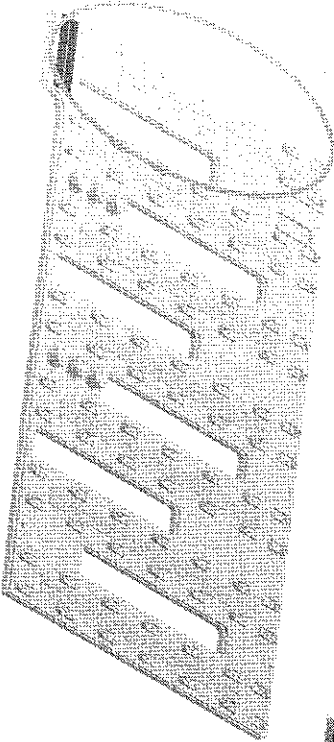
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Fill in by hand.				engineer:	location:	
Step	Action	Monitoring	Value	Result	Comment	
61.	Install the foil heater on top plate: <ul style="list-style-type: none">#2 liquid line foil heaters -FHK203 Kapton Thermofoil heater (red in the picture)#2 condenser foil heater -HK 27565 Kapton Thermofoil heater (yellow in the picture) 			OK		
				OK		

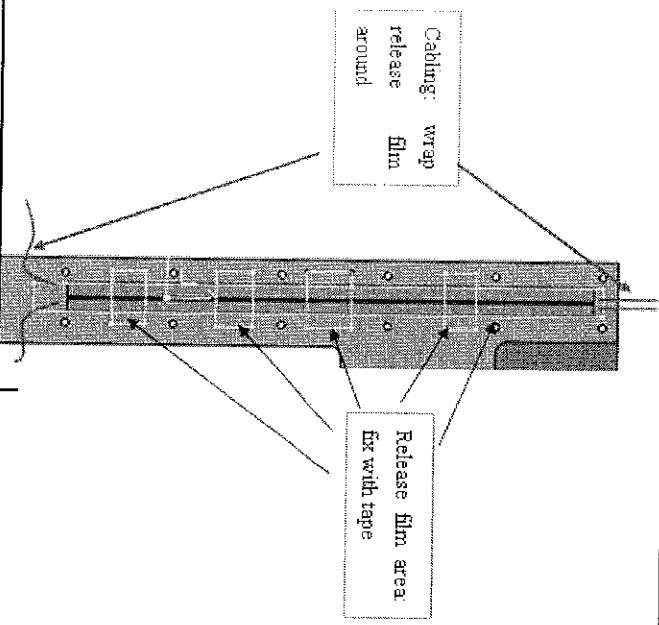


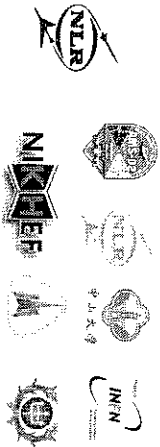
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Fill in by hand.				engineer:	location:	
Step	Action	Monitoring	Value	Result	Comment	✓
62.	Remove the tape on the top plate on the strain relief side, where the heaters have to be installed.				no necessary	
63.	Install heaters according to AMSTR_NLR_PR-043 procedure			OK		
64.	Protect the HK 27565 heater and cable with release film according to the following schematic, using release film and tape to fix.			OK		



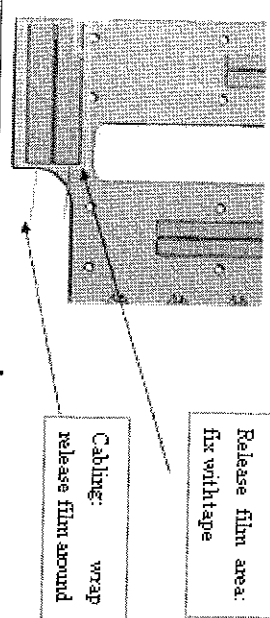
Condenser gluing procedure sheet			company:	date:
Fill in by hand.			engineer:	location:
Step	Action	Monitoring	Value	Result
65.	<p>Protect the FHK203 heater and cable with release film according to the following schematic, using release film and tape to fix.</p> 			OK
				USED AL TAPE TO FIX CABLES
				OK



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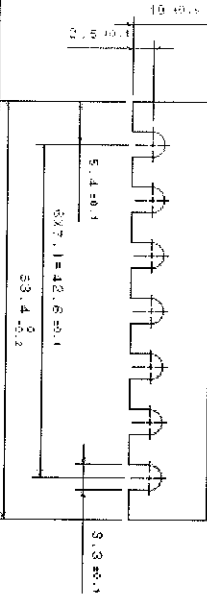
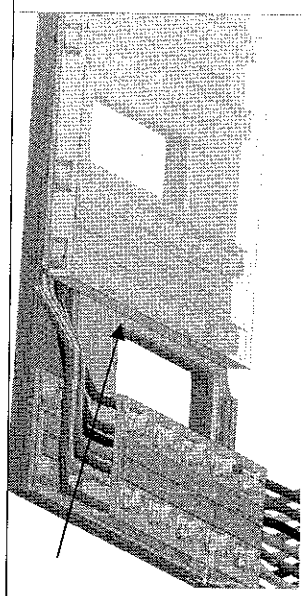
Condenser gluing procedure sheet					company:	date:	
Fill in by hand.					engineer:	location:	
Step	Action	Monitoring	Value	Result	Comment		
				OK			✓
66.	Use tape to fix the heater cable to the plate, to avoid stressing the foil heater wire connection			OK			
67.	Apply the adhesive MASTERBOND EP21TDC-2LO according to manufacturers instructions on the top plate	Record Mixing ratio applied		OK	FIXING TIME: 10:51 STARTING TIME: 11:45		
68.	Position top plate on bottom plate within accuracy by using D=5mm positioning pins.			OK	FINISH GLUING: 11:40		
69.	Insert the bottom strain relief (covered with the release film) on the top plate, with positioning screws, to support the tubes during the vacuum bag and to prevent excessive bending of the tubes.			OK	NO RELEASE FILM		
70.	Apply the bonding tool pocket				ADDED AFTER RESSEAL PLATE		



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Condenser gluing procedure sheet				
Fill in by hand.				
Step	Action	Monitoring	Value	Result
71.	Position the pressure plate over the top plate NOTE: THE PRESSURE PLATE HAS BEEN MODIFIED TO ALLOW PINS GO THROUGH. 			OK
72.	Put all the assembly on a vacuum bag and cure for 1 day 			OK
73.	SURFACE TREATMENT OF BOTTOM AND TOP STRAIN RELIEVES AND NUTPLATE INSTALLATION Open the vacuum bag, remove the pressure plate and the tape from the top plate surface			OK

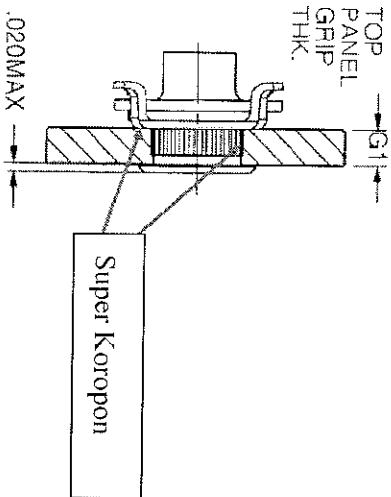


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Step	Action	Monitoring	Value	Result	Comment	
74.	Remove the PINS only strain relieves side.			OK	3 PINS RELEASE FILT OVER THE HEADERS WILL BE NOT REMOVED (AFTER 2:30 a.m.)	✓
75.	Perform the surface treatment of TOP and BOTTOM strain relieves following the procedure of the Bottom plate (from step to 28 to 36)			OK		
76.	Paint the contact surface between nutplate and TOP strain relief holes with Super Koropon Primer Base 515-700 (Don't add MEK, just use small amount of Super Koropon in a little cup and then refill when finished). Install the 10 nutplates using the installation tool DCBT8600-06			OK		
77.	Remove the nut on the nutplates that will be used for the positioning screws, using the removal tool			OK		



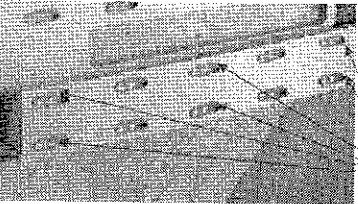
ACCORDING TO PINS POSITION



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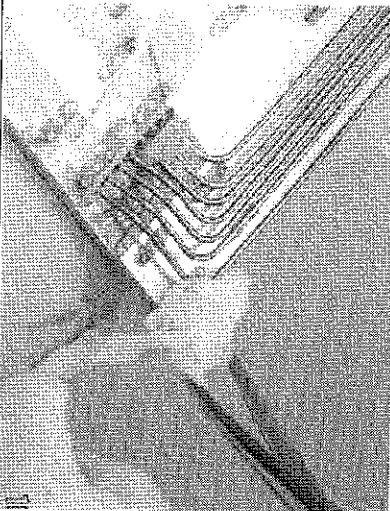
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Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	Result	Comment
78.	Clean inlet tubes on the pocket area 			OK	
				OK	



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Step	Action	Monitoring	Value	Result	Comment		
79.				Ok	USED THE 3M 850 ON THE EDGE BECAUSE THE OTHER ONE IS DIFFICULT TO REMOVE		
80.	Apply small square size pieces of the 3M 850 on holes of the bottom strain relief (Inner side, the one that will be glued): don't put the tape on the positioning screw holes.			Ok			



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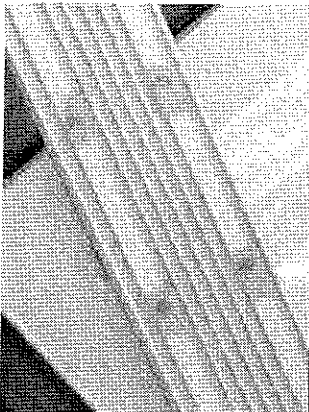
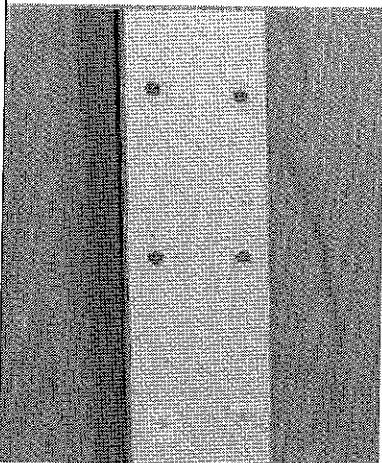
AMSTR-NLR-PR-038

Issue

draft 06

Date

December 2008

Condenser gluing procedure sheet				company:	date:	
Fill in by hand.				engineer:	location:	
Step	Action	Monitoring	Value	Result	Comment	
81.	Apply small square size pieces of the 3M 850 on holes of the top strain relief (inner side, the one that will be glued): don't put the tape on the positioning screw holes. 			OK		
						

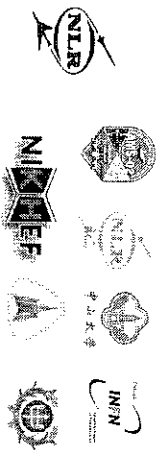


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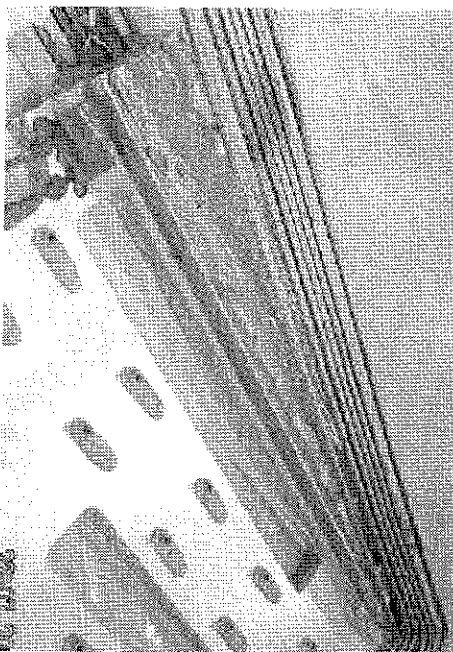
Condenser gluing procedure sheet		company:		date:	
Fill in by hand.		engineer:		location:	
Step	Action	Monitoring Record Mixing ratio applied	Value	Result	Comment
82.	Apply the adhesive MASTERBOND EP21TDC-2LO according to manufacturers instructions, in the grooves and all the internal surface of the bottom strain relief.		1:3	1:3	FIXING TIME: 10:30 PUL & PULX IN HEAT
83.	Cover the strain relief as in the following picture to protect the foil heaters already installed.				HEATERS PROTECTED WITH RELEASE FILM ALL TAPE ONLY ON THE BACK SIDE OF STRAIN RELIEF TUBES START TAPE AT 11:06 a.m
84.	Position and assemble the bottom strain relief on top plate, avoiding tubes touch the glue. Put the 2 positioning screws from the bottom side of the condenser to let the bottom strain relief be in the right position.			OK	PINS INSTALLED



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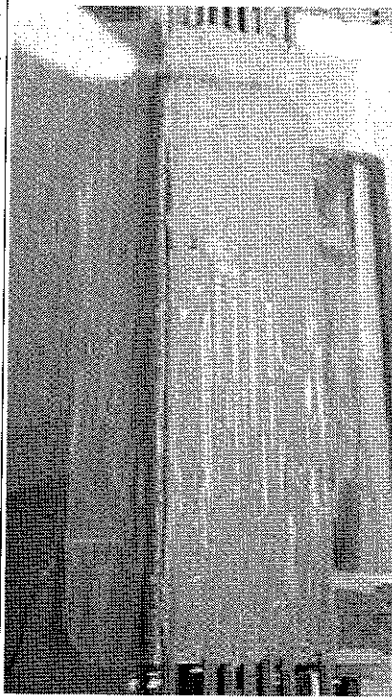
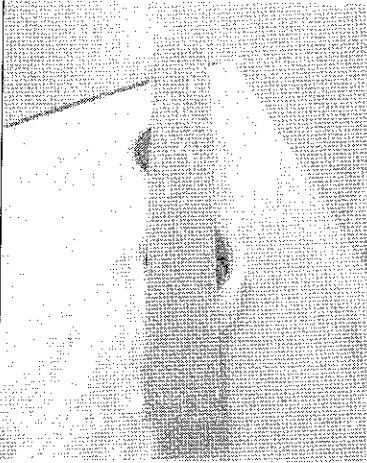
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Condenser gluing procedure sheet		company:		date:	
Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	Result	Comment
85.	Press tubes into bottom strain relief and refill a new glue layer			Ø16	
					



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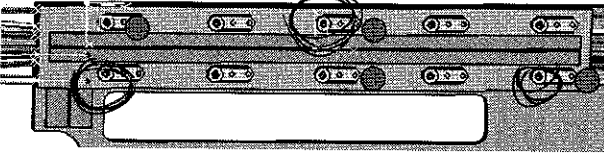
Condenser gluing procedure sheet					date:	
Fill in by hand.					company:	
					engineer:	
Step	Action	Monitoring	Value	Result	location:	Comment
86.	Apply a layer of 0.5 mm glue on the top strain relief and put the top strain relief to bottom strain relief.			OK		
				OK		
				OK		



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Condenser gluing procedure sheet				
Fill in by hand.				
Step	Action	Monitoring	Value	Result
87.	Apply 4 positioning screws from the nutplate side on the top strain relief			
				
88.	Press top strain relief to bottom strain relief			

date:

company:

engineer:

location:

Result

Comment

✓

3 position screws

OK



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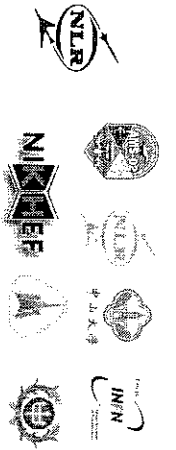
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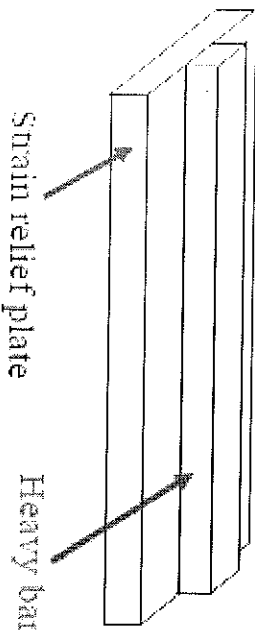
Date December 2008

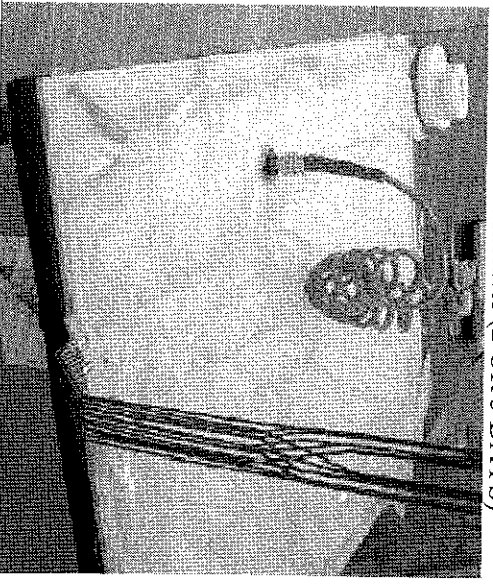
Condenser gluing procedure sheet					date:	
Fill in by hand.					company:	
					engineer:	
Step	Action	Monitoring	Value	Result	location:	
89.	Remove the 2 positioning screws from the bottom side of the condenser and apply to the nutplate side of top strain relief					
90.	Position the heavy bar over the top strain relief to have a uniform glue layer					



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QM-FM Condenser gluing procedure

Condenser gluing procedure sheet					date:
Fill in by hand.					location:
Step	Action	Monitoring	Value	Result	Comment
					OK FMSA TIME: 14:44
91.	Put all the assembly on a vacuum bag for the time period mentioned by the adhesive manufacturer (2 OR 3 DAYS)				OK






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Condenser gluing procedure sheet				company: A1DC	date:	
Fill in by hand.				engineer: E. Joubert	location: A1DC	
Step	Action	Monitoring	Value	Result	Comment	
	EDGE REFILLING CHECK				14th JANUARY 2009	✓
92.	Open the vacuum bag and check if the no voids are along the edges of the condenser. If so, refill using a syringe and needle to push the glue inside.				STRAIN BELIEF IS NOT FLAT (LIKE FM1)	
						



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Condenser gluing procedure sheet		company:		date:	
Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	Result	Comment
DRILLING THE HOLES					
93.	Open the vacuum bag and perform visual inspection of the gluing	Check glue thickness on sides	Uniform glue thickness on	ok	
94.	After curing time, remove the tapes and the pins from the condenser surface. Remove exceeding glue as better as it is possible.			ok	
95.	Drill the holes of the condenser to remove the glue inside (from bottom to top plate, to avoid going through the nutplate thread)			ok	
INSTALLATION OF FOIL HEATERS ON TOP PLATE AND TOP STRAIN RELIEF					
96.	Apply the remaining foil heaters on top plate and top strain relief according to the procedure AMSTR-NLR-PR-043			ok	
97.	Remove the tape on the condenser plates				
98.	WIEGHT RECORD				TAPE ON BOTTOM TOO DIFFICULT TO REMOVE! STICKY SURFACE SO BE CAREFUL WITH IT!!
99.	Put the condenser on a balance and record the weight	Record the weight measured		4114g	
100.	End				

Thickness value FM2 (mm)

